AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

Claims 1-55 are cancelled.

56. (Currently Amended) An optical waveguide, comprising:

a core, comprising an elongate region of relatively low refractive index;

a photonic bandgap structure arranged to provide a photonic bandgap over a range of wavelengths of light, the structure, in a transverse cross section of the waveguide, surrounding the core and comprising elongate relatively low refractive index regions interspersed with elongate relatively high refractive index regions; and

a relatively high refractive index boundary at the interface between the core ~~defect~~ and the photonic bandgap structure, the boundary having a thickness around the core such that, in use, light guided by the waveguide is guided in a transverse mode providing an F-factor of less than $0.23\mu m^{-1}$ for an operating wavelength of 1.55μm, less than an equivalent F-factor value scaled for a different operating wavelength or less than $0.7\Lambda^{-1}$ for structures having a periodic cladding and a pitch Λ.

57. (Currently Amended) A waveguide according to claim [[52]] 56, in which the boundary is anti-resonant at an operating wavelength of light.

58. (Currently Amended) A waveguide as claimed in claim [[52]] 56, in which the boundary has a substantially constant thickness around the core.

59. (Currently Amended) A waveguide as claimed in claim [[52]] 56, in which the boundary has a thickness that varies around the core, wherein the core boundary has a thickness t around at least a ~~proportion~~ fraction y of the boundary, where y > 0.5.

60. (Currently Amended) A waveguide as claimed in claim [[52]] 56, in which the boundary comprises, in the transverse cross-section, a plurality of relatively high refractive index boundary veins connected end-to-end around the boundary between neighbouring boundary nodes, each boundary vein being connected between a leading boundary node and a following boundary node, with no nodes in between, and each boundary node being connected between two boundary veins and to a relatively high refractive index region of the photonic bandgap structure.

61. (Previously Presented) A waveguide according to claim 60, wherein each boundary vein has a characteristic thickness substantially at the mid-point between the two boundary nodes to which it is connected.

62. (Previously Presented) A waveguide according to claim 60, wherein the characteristic thickness of at least one boundary vein is at least 110% of the

characteristic thickness of a plurality of the veins in the array of veins in the photonic band-gap structure.

63. (Currently Amended) A waveguide as claimed in claim **[[52]]** 56, in which the array has a characteristic primitive unit cell and a pitch Λ.

64. (Currently Amended) A waveguide as claimed in claim 63, in which the boundary has a thickness t, wherein, $t = u\Lambda$ for a ~~proportion~~ fraction y of the boundary **[[y]]**, where $u > 0.06$ and $y > 0.5$.

65. (Currently Amended) A waveguide as claimed in claims **[[52]]** 56, in which the core boundary has a thickness t defined by

$$\frac{a\lambda}{4\sqrt{n_{HI}^2 - n_{LO}^2}} \leq t \leq \frac{b\lambda}{4\sqrt{n_{HI}^2 - n_{LO}^2}}$$, where a=0.5 and b=1.75 and n_{HI} and n_{LOW} are the refractive indices of the boundary and of the relatively low refractive index region of the core, respectively.

66. (Cancelled)

67. (Previously Presented) A waveguide according to claim 56, in which the boundary is anti-resonant at an operating wavelength of light.

68. (Previously Presented) A waveguide as claimed in claim 56, in which the boundary has a substantially constant thickness around the core.

69. (Currently Amended) A waveguide as claimed in claim 56, in which the boundary has a thickness that varies around the core, wherein the core boundary has a thickness t around at least a ~~proportion~~ fraction y of the boundary, where y > 0.5.

70. (Previously Presented) A waveguide as claimed in claim 56, in which the array has a characteristic primitive unit cell and a pitch Λ.

71. (Previously Presented) A waveguide as claimed in claim 56, in which the core boundary has a thickness t defined by

$\frac{a\lambda}{4\sqrt{n_{HI}^2 - n_{LO}^2}} \leq t \leq \frac{b\lambda}{4\sqrt{n_{HI}^2 - n_{LO}^2}}$, where a=0.5 and b=1.75 and n_{HI} and n_{LOW} are the refractive indices of the boundary and of the relatively low refractive index region of the core, respectively.

72. (New) A waveguide as claimed in claim 56, in which the boundary has a thickness such that, in use, light guided by the waveguide is guided in a transverse mode in which, in the transverse cross-section, more than 95% of the guided light is in the regions of relatively low refractive index in the waveguide.

73. (New) A waveguide as claimed in claim 56, in which the boundary has a thickness such that, in use, light guided by the waveguide is guided in a transverse mode in which, in the transverse cross-section, more than 1% of the guided light is in the regions of relatively low refractive index in the photonic bandgap structure.

74. (New) A waveguide as claimed in claim 56, in which the boundary has a thickness such that, in use, light guided by the waveguide is guided in a transverse mode in which, in the transverse cross-section, more than 50% of the guided light is in the region of relatively low refractive index in the core.